GEOGRAPHICAL RELATIONS IN THE DEVELOPMENT OF CUBAN AGRICULTURE

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Cuba, the last of the independent nations that have sprung from the wreck of Spain's colonial empire in the New World, began its separate national existence in 1899. Its rapid progress and material prosperity cause it to stand out among the Latin American states. In 1920 the island, whose area is only about that of the state of Pennsylvania, had a part in international trade greater than that of Brazil and nearly three times as large as that of Spain. The high ranking of Cuba in this year, due in large measure to the high price of sugar at the time, is an indication of the vast importance of Cuba's principal product. In the fiscal year of 1920 the island sold to the outside world products valued at $850,000,000, and 91 per cent of this was sugar. For the calendar year of 1920 the exports amounted to $573,000,000. The falling off was almost wholly due to the decline in the price of sugar.

Cuba holds first place among the cane-growing countries of the world, though it has risen to this commanding position only recently. Cuban sugar production did not reach a million tons a year until 1895, shortly before the end of Spanish rule. Since Cuba attained independence and its relations to the United States became closer, sugar production has nearly quadrupled. There is no other independent country so completely devoted to a single industry as Cuba is to sugar. The life of the island centers around this product. Everywhere men talk sugar; it dominates politics and finance, and its price determines activity in every line of business. The sudden drop in price in 1920 was a stunning blow to Cuba, and the whole financial system of the nation staggered under it. The abounding prosperity which had nearly amounted to intoxication suddenly came to an end, and the ensuing financial strain brought the island to the verge of collapse.

This dominance of sugar is peculiarly the outgrowth of the island's geographical position, coupled with its endowment of fertile soil and level land. These features will be considered in relation to the development of this and other subordinate resources of the island.

THE HIGH PROPORTION OF AGRICULTURAL LAND

While Cuba is a part of the Antillean mountain system, it has been largely reduced to fertile plains.[1] Only in the eastern quarter is the island dis-

[1] For a condensed account of the geology see M. L. Fuller: Notes on the Hydrology of Cuba, *U. S. Geol. Survey Water-Supply Paper 110*, pp. 183–199. For a more complete account see "Report on a Geological Reconnoissance of Cuba" made to General Leonard Wood by Hayes, Vaughan, and Spencer, and published in 1901.

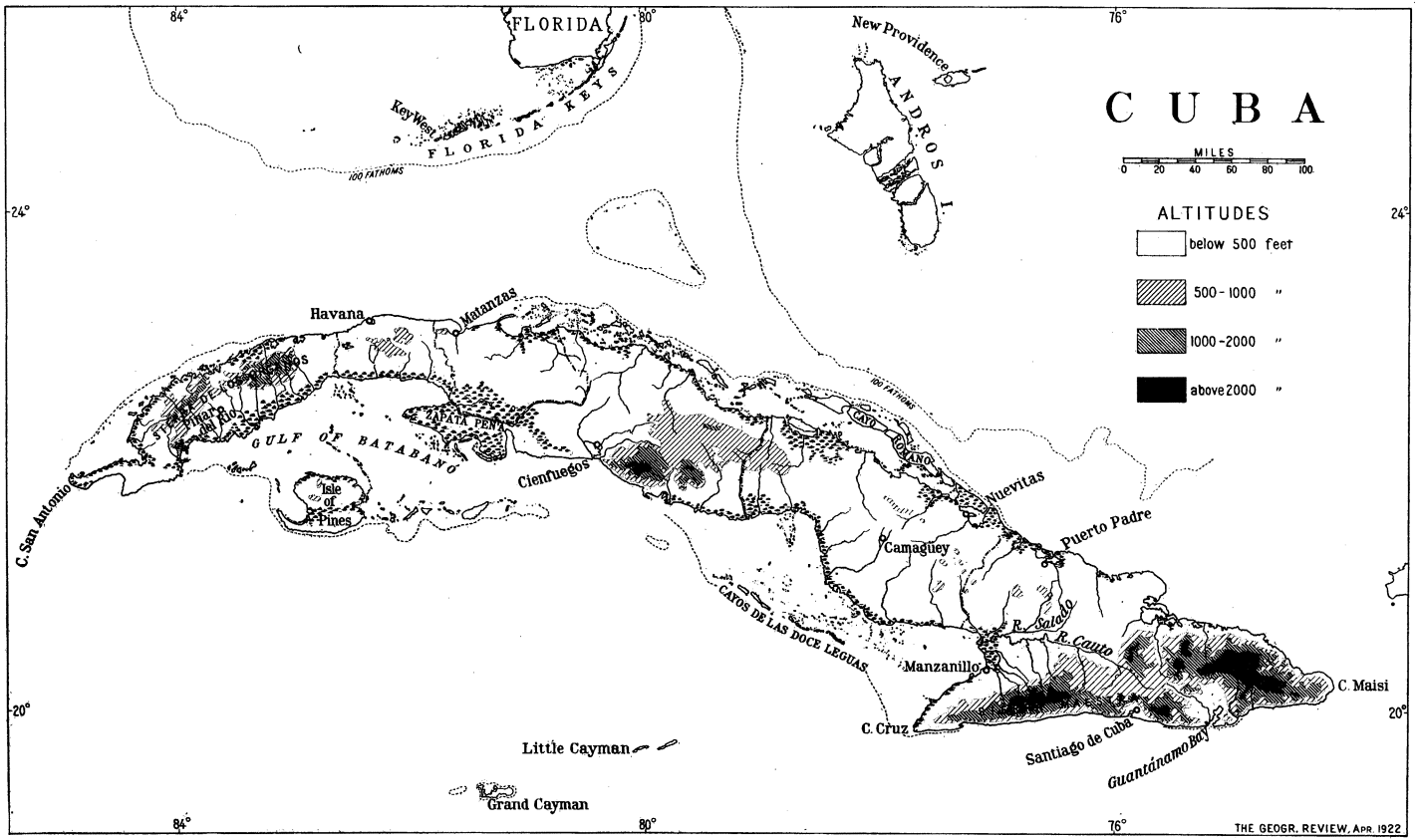

FIG. 1—Map of Cuba showing relief. Scale approximately 1: 6,600,000.

tinctly mountainous, and the total mountainous area does not exceed one-fifth.[2] The Sierra Maestra range, close to the southern shore of Oriente, rises to elevations of nearly 9,000 feet. This is the most wild and undeveloped part of Cuba, yet a great deal of the province is made up of fertile valleys and gentle slopes. One valley, that of the Cauto, 100 miles long, is the most pronounced valley in the island and is very fertile. In recent years the largest increase in sugar plantations and sugar mills in any part of Cuba has been in Oriente.

A low range of mountains—the Sierra de los Organos—attaining heights of 2,500 feet, extends parallel to the northern coast in Pinar del Rio, the westernmost province. However, the nearly level plains of this province exceed the area of the mountains and include the most valuable tobacco land of Cuba, the Vuelta Abajo district west of Havana. A few other groups of low mountains and occasional spurs exist near the southern coast and near the northern coast, but they are neither long nor high. Of these the most picturesque are the Trinidad Mountains near the southern coast in the province of Santa Clara. One extensive swampy area, the peninsula of Zapata, occupies a strip 60 miles in length and 25 in width on the southern coastal plain west of Cienfuegos. The rest of Cuba, and the major part, is made up of level or nearly level lands sloping gently from an almost indiscernible water-parting extending lengthwise of the island. Contrary to the showing on many maps, no mountain chain extends east and west through the middle of Cuba; the trunk railroad of the island traverses this middle line. Over 80 per cent of Cuba is actual or potential agricultural land, and 10 per cent more is equal in quality to land that produces crops in Java, China, and Japan. Cuba could, if necessary, grow more sugar cane than all the world now produces.

The Great Fertility of the Soil

The ancient land of Cuba was submerged beneath the sea for geological periods of great length and was buried beneath a thousand feet or more of sediments, the greater part of which is limestone. Two-thirds of the island is still covered by this limestone, deeply disintegrated. In places the younger rocks have been entirely denuded, and the masses of ancient crystallines project through the sedimentary beds like islands rising above the sea.[3] The limestones are honeycombed with caves, some of them—as, for instance, the caves of Bellamar in Matanzas—are famous for their extent and beauty. Many streams disappear into the ground and perhaps reappear; while over large areas there is no surface drainage whatever. The

More recent data are contained in "Contributions to the Geology and Paleontology of the Canal Zone, Panama, and Geologically Related Areas in Central America and the West Indies," *U. S. Natl. Museum Bull. 103*, Smithsonian Instn., Washington, D. C., 1919. An account of the physiography and stratigraphy of Cuba and the Isle of Pines by Dr. Vaughan of the U. S. Geol. Survey is promised for forthcoming publication.

[2] R. T. Hill (Cuba and Porto Rico with other Islands of the West Indies, New York, 1898) estimates the mountainous area at one-fourth.

[3] J. W. Spencer: Geographical Evolution of Cuba, *Bull. Geol. Soc. of Amer.*, Vol. 7, 1896, pp. 67–94.

residual loams, both red and black, are derived from the age-long disintegration of the limestones and have the characteristic fertility of such soils. Though parts of Cuba have been cropped for four hundred years, very little of the sugar land is artificially fertilized. The cane yield per acre is larger than in almost any other region of America and larger than in Java or India but only half as large as in the irrigated lands of Hawaii.

The Many-Harbored Coast

Cuba rests upon a submarine platform which is much larger than the island itself. Over this platform the waters are shallow, and coral growth is abundant. A barrier of coral islands or reefs—said to be 570 in number—parallels a part of the northern coast, and an even larger number (730) are scattered along the southern shore.[4] Nearly everywhere the coast is abrupt and clifflike. Along much of the northern coast and along the southern coast of the province of Oriente, rock terraces, rising one above the other, are conspicuous features. At least six of these are recognizable near Matanzas east of Havana,[5] and eight occur near Santiago, the highest being 400 feet above the sea.[6] These terraces plainly represent successive uplifts of the land, the uplift being greatest at the eastern end of the island. Further evidence of these uplifts is seen in the young valleys and gorges carved in the floors of the older valleys. These are especially noticeable from the railroad as one rides through the province of Oriente.

A low divide occupies the main, or east-west, axis of the island, and numerous short rivers flow either to the north or to the south except in the mountainous province of Oriente. At the mouths of the rivers land-locked harbors occur, numerous and excellent. As Hill says, "They are so conveniently situated as regards different portions of the island that the trade of Cuba may be said literally to pass out at a hundred gates."[7] Almost every one of the harbors has a characteristic pouch shape—a narrow entrance opening into a broad bay (Fig. 2). The uniformity in the shape of these harbors on both sides of the island suggests that they are due to a common cause. Havana, Cienfuegos, and Santiago—the most important harbors of Cuba—are all similar. The harbor of Nuevitas (Fig. 2) on the northern coast is a good example of these peculiar pouch-shaped bays of Cuba. The entrance to this harbor is only one-sixth of a mile wide in the narrowest portion and broadens as you proceed from the sea to the inner bay, which is eight miles broad. At the narrowest place in the entrance the water is over 100 feet deep but is much shallower in the broad part of the inner bay. Clearly this deep narrow channel connecting the ocean with the broad inner bay is a young valley cut by a stream through the

[4] R. T. Hill, *op. cit.* p. 36.

[5] J. W. Spencer, *op. cit.*

[6] T. W. Vaughan and A. C. Spencer: The Geography of Cuba, *Bull. Amer. Geogr. Soc.*, Vol. 34, 1902, pp. 105–116; reference on p. 113.

[7] R. T. Hill, *op. cit.*, p. 86.

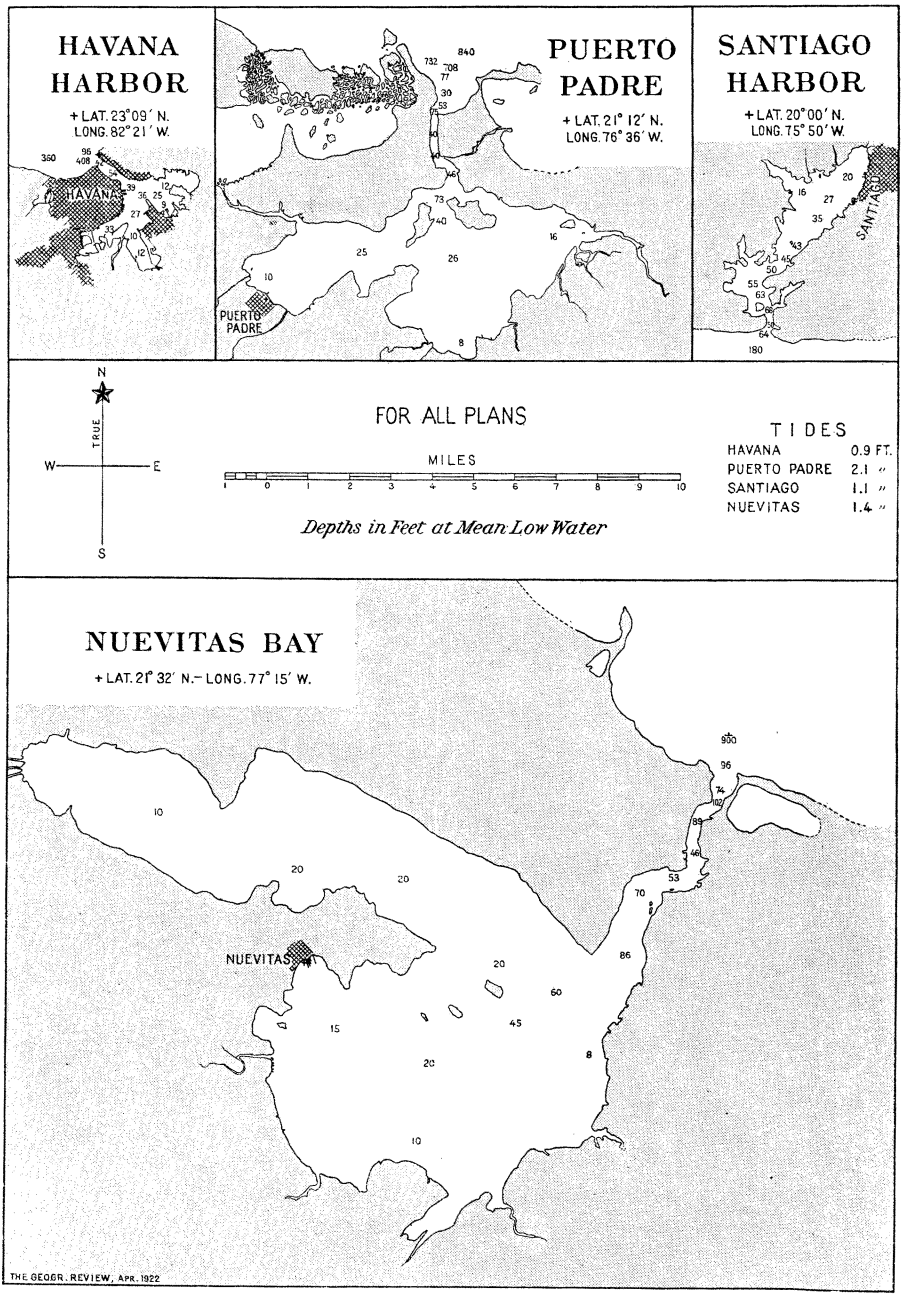

FIG. 2—Examples of the characteristically pouch-shaped harbors of Cuba. The four maps are drawn to the same scale and are based on U. S. Hydrographic Charts, Harbor of Habana (No. 307), Port Padre (No. 1970), Santiago Harbor (No. 1856), Nuevitas Bay (No. 1883).

younger rock formation along the shore; tidal currents may have aided. The youngest part of the entrance channel is the part nearest the ocean, and this fact suggests strongly that the successive uplifts of the coast lands have been gradual enough to permit the river and the tidal currents to maintain a channel across the rising coast strip of coral reef or other rock. The steplike terraces which are so common along the Cuban coast prove the successive uplifts, and the shape of the harbor entrances—narrowest at the seaward end—indicates that the most youthful parts of these channels are at the outer or seaward ends. The notable depth of many of the harbor entrances seems to indicate a recent moderate sinking of the coast. That the pouch-shaped harbors are drowned drainage basins is the theory held by Hayes and Vaughan, who find a particular demonstration of the validity of the theory in present conditions along the Yumuri River near Matanzas. "The river here empties into the sea through a narrow gorge cut through Miocene limestone and marls . . . Above the gorge, the Yumuri and its tributary, Rio Caico, have sunk their courses through the limestone, have removed it, and have developed wide, almost base-level valleys on the underlying softer sandstone and shale. If this basin were depressed sufficiently to let the sea into it through Yumuri gorge a pouch-shaped harbor would result."[8] The number of such harbors on both coasts and their excellence greatly facilitate the exportation of the enormous sugar crop, preventing the congestion which must occur if only a few ports were used.

The Cuban Climate[9]

The outstanding features of the temperature of Cuba are the uniformity throughout the year and from year to year. The three warmest months at Havana average only 10° warmer than the three coolest, while the difference at Santiago de Cuba is only 5° or 6°. Contrast this with the temperatures at Galveston which vary from 83.3° in summer to 55.6° in winter, or 27.7°. The highest recorded temperature in Havana is 100.6° in July, 1891; and the coldest is 49.6° in February, 1896. The temperature in any given month varies little from year to year. The difference in mean temperature between the warmest and coolest recorded July is less than 2°, and between the coolest and the mildest January is less than 6°. Snow is unknown, and frost is known only in the higher altitudes. There is also a marked uniformity of temperature throughout the island (disregarding the influence of altitude in the mountainous sections). This is largely due to the equalizing effect of the surrounding ocean and to the fact that the long axis of the island extends east and west rather than north and south.

[8] T. W. Vaughan: Fossil Corals from Central America, Cuba, and Porto Rico, etc., *U. S. Natl. Museum Bull. 103*, pp. 189–524; reference on p. 284. A fuller discussion of the Cuban harbors is promised in a forthcoming paper.

[9] The data used in the section on climate are taken for the most part either from official publications of the U. S. Weather Bureau or from "El Clima de Cuba" by Mariano Gutiérrez-Lanza, *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 2, Section 2, Astronomy, etc., Washington, D. C., pp. 132–172.

The rainfall cannot be called heavy, and there is wide variation between years of maximum and of minimum precipitation. On the northern coast the average annual rainfall is 50 inches; on the southern coast, 45 inches; and in the interior, 60 inches. Distribution has a distinctly seasonal character—a "dry" season of about five months (December to April) and

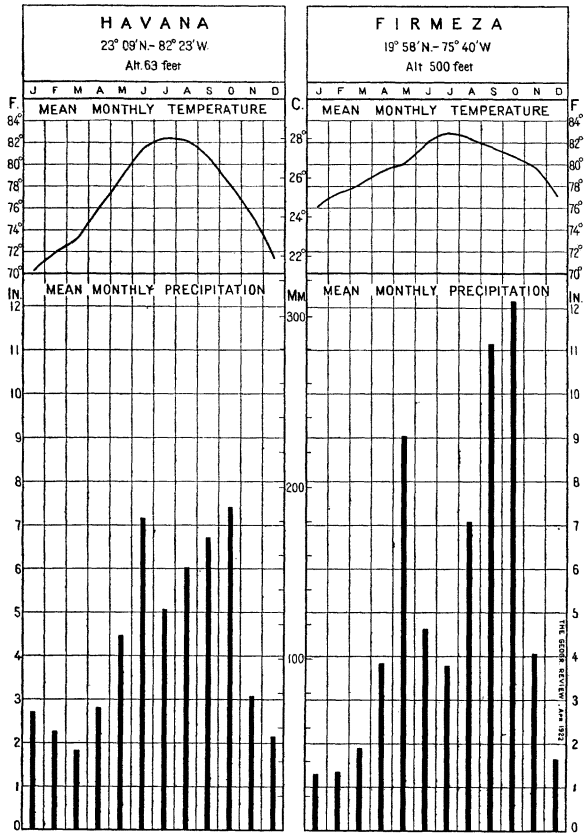

FIG. 3—Graph showing the mean monthly temperature and rainfall at Havana and Firmeza (near Santiago). The higher land of the eastern end of the island has in general the heavier rainfall. Data from the Annual Report of the Chief of the U. S. Weather Bureau, 1897–1898.

a "wet" season of about seven months (May to November). Over a period of 30 years the precipitation during the wet months ranged from 22 inches to 49.5 inches in Havana, and from 8.8 to 33 inches during the dry months. The heaviest rainfall comes in September and October, months of low atmospheric pressure and hurricanes in the Caribbean region. The heavy rainfall of May is plainly due to a secondary low pressure period occurring at that time.

Rains are of the tropical downpour type; 6 inches of rain have fallen at Havana in 24 hours, and 13 inches at Firmeza near Santiago on the

southern coast. Showers are three times as frequent in the afternoon as in the forenoon; they are soon over, and sunshine returns quickly. Relative humidity is remarkably uniform from season to season, averaging about 75 per cent in Havana through the year in the dry season and wet season alike.

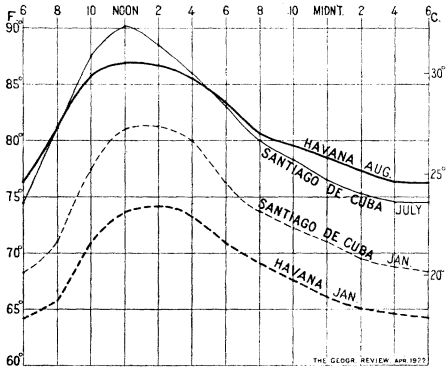

FIG. 4—Graph showing the daily march of temperature in the warmest and coolest months of the year at Havana and Firmeza. Data from the Annual Report of the Chief of the U. S. Weather Bureau, 1897–1898.

Cuba is in the belt of trades throughout the year and there is relatively little difference in the strength or direction of the winds from month to month. Tropical hurricanes are occasional but not frequent; of 22 such storms occurring in the West Indies and studied by the U. S. Weather Bureau, only 7 crossed Cuba. The diurnal variation in velocity is pronounced however. Thus at Havana the wind, which has an average velocity of 4.3 miles an hour at 4 A. M., increases to a maximum of 11.4 miles an hour at 2 P. M., diminishing to 5.6 at 10 P. M.[10]

TABLE I—NUMBER OF DAYS PER MONTH ON WHICH RAIN FELL AT HAVANA

(Data for 35 years)

	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Minimum	1	1	1	0	3	4	7	9	7	7	5	3
Mean	8	6	6	5	9	13	13	13	15	15	10	8
Maximum	14	13	10	9	16	21	20	21	25	22	16	16

Such are the more salient features of the Cuban climate. As regards relation to the most important crops of the island note should be made of the following points: (1) Freedom from frost—permitting sugar cane to grow year after year without replanting; (2) a hot, rainy season ideal for the growth of cane; (3) a season of light rainfall, suited to the harvesting of sugar cane, which is injured by wetting after it is cut, unless promptly ground; (4) freedom from extremes of temperature; (5) a climate suited to white occupation and much relieved by cool nights and by the trade winds which, strengthening in the afternoon coincidently with increasing temperature, afford a delightful unfailing breeze that takes away much of the oppressiveness of the tropical heat. On the whole, Cuba has a climate that is ideal for vegetation and not ill suited to the maintenance of an energetic race.

[10] *U. S. Weather Bur., Rept. of the Chief, 1897–98*, p. 314.

The Forests

Originally Cuba was largely but not entirely forest-covered. In 1899, when the first careful census was taken, it was estimated that 27 per cent of the area was covered with large timber and 14 per cent with small timber; a part of the latter was presumably new growth on lands formerly under cultivation. Thus, in 1899, 41 per cent of the island was forested, and the major part of this was in the eastern end of the island. Clearing is still in progress, for the newly cleared ground affords the most productive cane land. The census of 1907 gives the following distribution of forests by provinces: Oriente 520,000 acres, Santa Clara 308,000 acres, Pinar del Rio 148,000 acres, Matanzas 113,000 acres, Camaguey 88,000 acres, Havana 49,000 acres. Evidently these figures include only forests containing merchantable timber, for the total, 1,220,000, is less than five per cent of the land area of the island, and certainly four or five times this area is covered with forest growth of some sort. Occasional glowing accounts of the great wealth of mahogany and cedar in Cuba are only partially true.

Agriculture

In early colonial days cattle raising was the chief occupation of the colonists, and it has remained an industry of importance down to the present time. The latest enumeration indicates that there are nearly 4,000,000 cattle in the island, a considerable proportion of which are oxen used as draught animals. A large proportion of the cattle ranges are in the province of Camaguey. Every sugar plantation has many oxen, in some cases reaching into the thousands; they do nearly all of the work of plowing, harrowing, and hauling. They feed upon the stripped-off leaves of the cane and are sleek and fat in the harvest season. The beef animals are slaughtered on the plantations to supply meat for the laborers or are sent to the cities for supplying the meat markets. Practically no animals or meat are exported, but certain beef and pork products are imported in large quantities.

General farming as we know it in the United States is not practiced in Cuba. Sweet potatoes, Indian corn, and the yucca are raised to supply a part of the food. Cuba could produce a great deal more of its food than it now produces; but Cubans do not take to this occupation, very few of the country people even having gardens.

The most accurate census of Cuba was that of 1899, at which time the percentage of total cultivated area devoted to sugar cane was 47.3, to sweet potatoes 11.3, to tobacco 9.3, to bananas 8.6, to Indian corn 7.3, to malangas 3.4, to yucca 3.2, and to coffee 1.6 (eight other minor crops are listed in the census).

When Cuba became independent, the percentage of land in farms and under cultivation was as shown in Table II.

TABLE II—PERCENTAGE OF LAND IN FARMS AND UNDER CULTIVATION IN CUBA IN 1899

PROVINCE	PERCENTAGE IN FARMS	PERCENTAGE CULTIVATED
Havana	45.6	5.8
Matanzas	41.4	6.6
Pinar del Rio	33.8	4.3
Camaguey	29.2	.4
Santa Clara	30.6	4.0
Oriente	22.0	2.4
Cuba	29.9	3.0

It is reported that at the end of the Spanish régime Cuba had 91,000 plantations, farms, orchards, and cattle ranches valued at $200,000,000—an average of about $2,200 each. Table III shows the reported use of the land in 1850.

TABLE III—POPULATION AND CULTIVATION ACCORDING TO THE CENSUS OF 1850 BY DEPARTMENTS*

		WESTERN	CENTRAL	EASTERN
POPULATION	Total	734,300	246,000	226,930
	White	325,500	153,000	87,060
	Free colored	88,300	42,500	74,770
	Slaves	320,500	50,500	65,100
CULTIVATION	Sugar estates	735	404	303
	Coffee estates	1,012	76	580
	Tobacco estates	3,990	967	4,145
	Grazing estates	1,741	4,881	3,308

* The western department includes Pinar del Rio, Havana, Matanzas; the central, Santa Clara and Camaguey; the eastern, Oriente.

Notwithstanding the great quantity of sugar and tobacco produced in Cuba, not over one-tenth of the area is under cultivation, and several million acres of excellent sugar land have not yet been cleared. Little fertilizing is done.

SUGAR[11]

Cuba's geographical position on the outer margin of the tropics gives it the ideal temperature and rainfall for growing sugar cane. While planters in Louisiana, with its winter frosts, must replant their cane each year, in Cuba cane does not require replanting for eight or ten, or even twelve years.

[11] Much of the statistical matter used in this section is taken from *Bulletin 53, Miscellaneous Series, U. S. Dept. of Commerce*, 1917.

It has already been pointed out that the major part of the soils of Cuba is derived from the breaking down of limestones and that there is a large proportion of level land; according to a recent *Commerce Report* "over three-quarters of Cuba is level enough to admit of the use of the most improved farm machinery." The red lands which are so conspicuous in Havana and Matanzas provinces and which appear elsewhere are a very porous residual clay loam through which water passes readily into the cavernous limestone below, giving excellent drainage and permitting tillage shortly after a rain. These red soils are by many regarded as the best sugar lands of Cuba. The black soils rest sometimes upon a white calcareous subsoil, and sometimes upon an impervious clay subsoil; they are exceedingly fertile, especially when newly cleared, and if drainage is good produce the heaviest crops of cane.

The ground is plowed, cross plowed, harrowed, trenched, and planted with pieces of cane containing one or more joints. During early growth the cane must be cultivated like corn. In from fifteen to eighteen months it is ready for cutting and may be cut annually for many years without replanting. An acre of good land annually yields twenty tons of sugar cane and two tons of sugar. As the cane matures, the lower leaves become dry and easily catch fire; in fact the greatest danger to the cane fields arises from fire, and special precautions must be taken against it.

The large crop of 1920–1921, reaching nearly 4,000,000 tons, was grown on about one-twentieth of the area of the island (1,400,000 acres). Thus five per cent of the land of one island yielded nearly a quarter of the sugar which the world used in 1921. This sugar was ground in about 200 mills.

In 1920–1921 the percentage by provinces of the total sugar crop produced was as follows: Santa Clara, 24; Oriente, 23; Camaguey, 20; Matanzas, 18; Havana, 11; Pinar del Rio, 2.

Each large sugar estate has its own mill, or central, from which railways or tramways radiate. At least one plantation has upwards of 200 miles of railroad and 25 locomotives, while another has 2,800 oxen, mules, and horses; and one group of 22 plantations has 15,000 work animals. The investment in a plantation and its mill reaches into the millions. A few of the largest mills produce 700,000 to 800,000 bags, or 200,000,000 pounds, of sugar a season. The cutting season is from December to about June, but it may extend even to September. The owner of the central produces only a minor part of the cane needed by his mill; the greater part—said to be 80 per cent—is grown under contract by tenant planters, called *colonos*, or is purchased from independent growers. There are about 22,000 *colonos* thus engaged in Cuba, the average area cultivated by each being about 66 acres. The cane is cut and stripped by hand, and this calls for a large force of laborers during the cutting season; but there is not sufficient employment for these laborers during the remainder of the year. Large numbers of Jamaicans and other West Indian negroes come for the sugar harvest, and many return home in the dull season. Some labor is recruited from

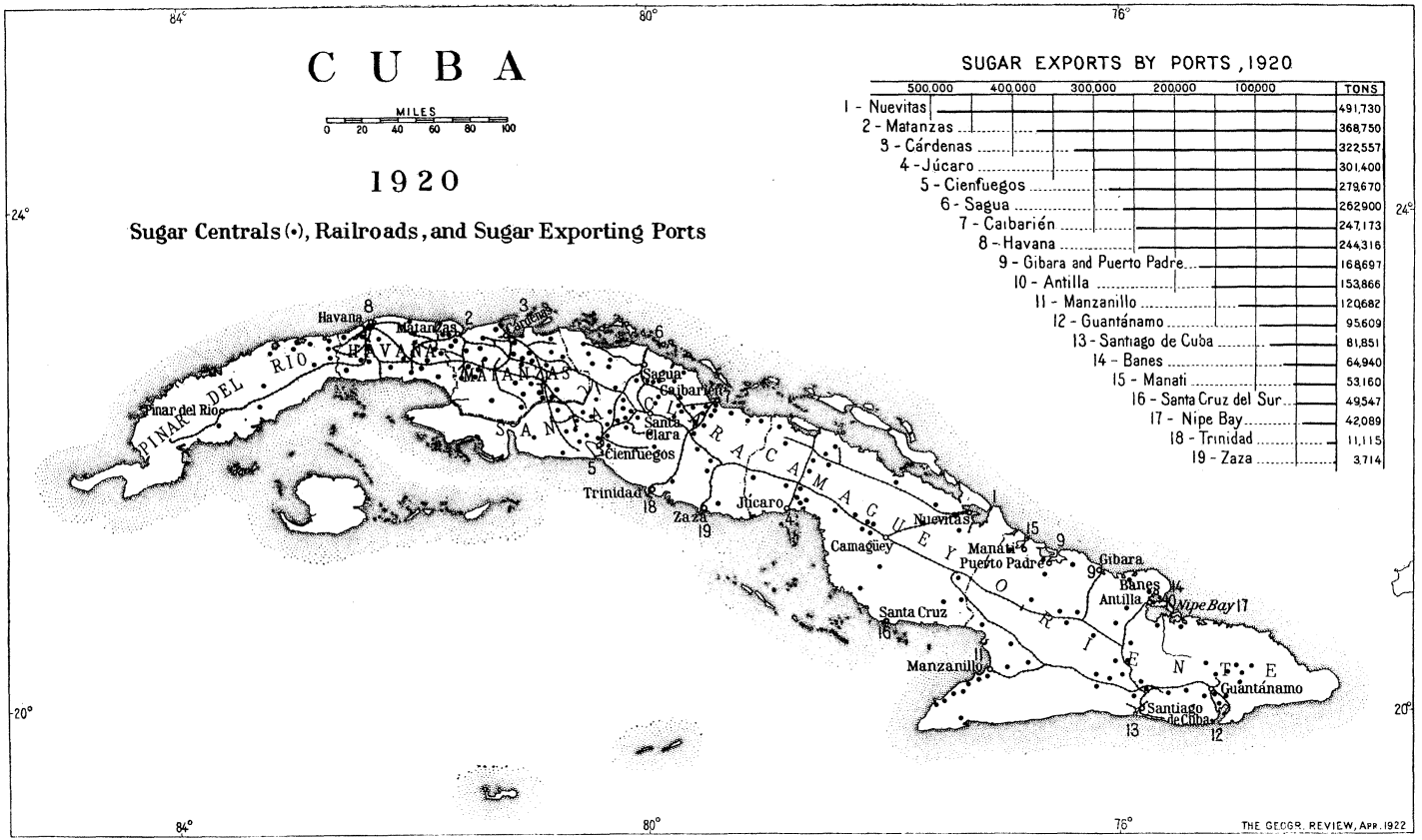

FIG. 5—Map of Cuba showing railroads, sugar-exporting ports and sugar centrals in 1920. The inset graph shows the amount of sugar export by ports. Scale approximately 1 : 6,600,000.

Spain and the Madeira Islands, but there is never enough. Shortage of labor is the chief problem that has to be faced by the planters. A majority of the 80,000 yearly immigrants into Cuba come for the sugar harvest. Much of the work is done as "piece work," the laborer being paid by the ton or by some other unit.

If Cuba could get labor or invent machinery to harvest the crop, the island could supply more sugar than all the world now produces. At average prices one good crop of cane is worth nearly the price of the land, and it is said that practically every central in Cuba made enough to pay for itself in 1918 and 1919; but in 1920–1921 little if any profit was made, and some of the largest companies lost heavily.

The cane is hauled to the railways and sometimes to the mills in ponderous ox carts over very bad roads, and the cost of getting the cane to the mill is one of the large items of expense. All parts of the island are so near the coast and there are so many harbors that no plantation is far from a shipping port. The increased production of recent years is mainly due to the many new American-owned estates which are being brought under cultivation in the eastern provinces of Camaguey and Oriente.

Cuba's geographical position is most advantageous for marketing the sugar, for it lies at the door of the greatest sugar-using nation in the world. The ocean freight rate on raw sugar from Cuban ports to New York, Boston, or Philadelphia, together with commission, brokerage, etc., normally is around a quarter of a cent a pound, an almost negligible figure. Moreover, the nearness of Cuba and its close relations with the United States have made it easy to attract American money, which has revolutionized the sugar industry by erecting the largest and most efficient of mills and by supplying ample funds for financing the industry. In 1916 the average cost of producing raw sugar in Cuba, including depreciation of plant, was less than 1.5 cent a pound, and a few mills made it at a cost of 1.1 cent a pound. With Spanish methods it cost three or four times as much, and present costs are twice as high as they were in 1916. About 40 per cent of the mills in 1916 were classed as American-owned, and at least $600,000,000 of American capital was invested. The number of American-owned mills has doubled since 1914, and they now grind more than half of the sugar. One company, the Cuba Cane Sugar Corporation, has over 20 estates, involving an investment of more than $50,000,000. An editorial note in *Facts About Sugar* of July 10, 1920, says: "The number of mills and plantations that have changed hands during the past six months represent values that run into the hundreds of millions of dollars. They exceed similar transactions of the past decade." In 1915 the sugar companies owned over 3,000,000 acres of land, less than half of which was under cultivation. Since that date many large purchases of land have been made, and it is probable that the holdings of the sugar companies now equal or exceed 4,000,000 acres.

Nearly all of the sugar is shipped from twenty ports, the majority of

which are on the northern shore of the island. The proportion shipped from any given port fluctuates from year to year but not very greatly.

The Tobacco Industry

It was in Cuba in 1492 that Europeans first came in contact with tobacco, and it is in Cuba that the finest tobacco is still grown. The trade recognizes four general types of Cuban tobacco. The coarse, cheap grade grown in the province of Oriente is known as *Mayari y Gibara*. The *Remidios* of Santa Clara province and the *Portidos* of Havana are better in quality, but the tobacco that has made Cuba famous is the *Vuelta Abajo* of the province of Pinar del Rio in the western end of the island. Here in a very definitely marked area about 90 miles long and 10 miles wide, lying just south of the Organ Mountains, is grown the world's finest tobacco. It has been proved that the flavor and aroma of tobacco are determined more by soil than by climate. The texture and other physical qualities of the leaf are greatly improved by growing the plants under a covering of cheesecloth. The soil of the Vuelta Abajo district is a peculiar sandy loam, quite in contrast with the clay loams of the sugar-growing districts.[12] Why this particular soil should impart to the leaf the delicate and delightful quality possessed by no other tobacco in the world is an unexplainable but unchallenged fact.

The tobacco farms, called *vegas*, average from 30 to 40 acres in extent and are usually operated by Cuban owners with white labor—quite commonly Canary Islanders. Tobacco is a winter crop; the plants are set late in October in soil heavily fertilized and prepared with utmost care. In the Vuelta Abajo district one man devotes his whole time to about 2 acres, cultivating, pruning, and keeping off insect pests. This means that about 20 men are employed on the average farm of 40 acres. It has been estimated that 80,000 persons are employed in tobacco culture in Cuba.[13] Somewhat more than half of the tobacco grown in Cuba (in value) comes from the Vuelta Abajo district. Good tobacco land in this district is worth a thousand dollars an acre, or more, and often produces a thousand dollars' worth of tobacco per acre per year and in exceptional cases even two or three times as much. The leaves are cut in January, very carefully cured, and packed in bales of 50 kilos each. Havana is the center of cigar and cigarette making, a large part of which is in the hands of foreign corporations employing Cuban labor. The McKinley tariff placed a heavy tax on imported cigars, but a light tax on leaf tobacco; this caused many Cuban manufacturers to establish factories in Key West and Tampa where they continue to use skilled Cuban labor, both men and women.

During the fifteen years preceding the World War the exports of tobacco and its products averaged 22.6 per cent of the total exports from Cuba;

[12] See the descriptions of the Vuelta Abajo district in J. B. Henderson: The Cruise of the Tomas Barrera, New York, 1916, p. 229 *et al.*

[13] R. P. Porter: Industrial Cuba, New York, 1899, p. 306.

but this percentage is declining, having been only 16 in 1914 and 6½ in 1920, while sugar rose to 91 per cent in 1920.

Other Crops

Coffee, once highly important, especially in the eastern end of the island, has all but disappeared—unable to meet the competition of Brazil. The industry was established by refugees from Santo Domingo, some 30,000 of whom came into eastern Cuba about 1798. Cuba had 2,300 coffee plan-

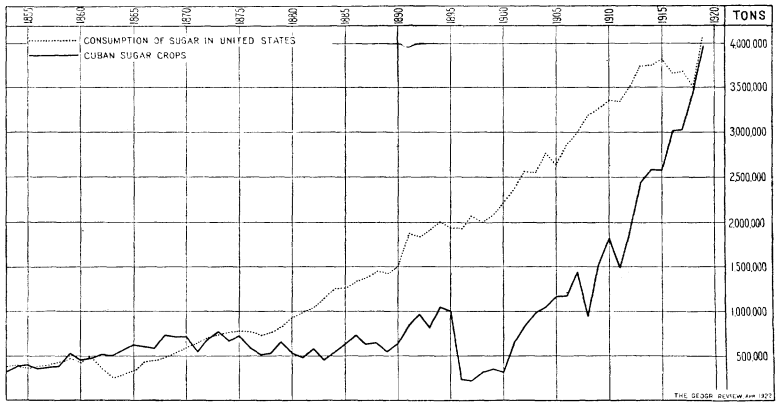

FIG. 6—Graph showing the importance of Cuban sugar production to the United States and the advantage to Cuba of a near-by market for her principal product. Note the effect of the rebellion of 1895 and the Spanish-American War.

tations large and small in 1846, at which time the permanent decline of this industry began in consequence of the violent hurricanes of 1843 and 1846. There was a partial revival after the independence of the island was achieved in 1898, but it was of short duration.

Henequen has been introduced from Yucatan and is doing well on land that was regarded as useless. Most of it is raised in the province of Matanzas and has given rise to two or three large mills.

Systematic fruit growing is relatively unimportant in Cuba, though a good deal of fruit is actually grown—much of it in a more or less haphazard way. The banana and the pineapple plantations attempted by Americans have been only partially successful financially. The fruit lands of the Isle of Pines, south of the western end of Cuba, are largely owned by Americans who have developed pineapple and grapefruit growing with moderate financial success. These fruits go by boat, daily trains, and car ferry to the United States. Over a million crates a year were shipped in the years around 1910, but the industry has since declined. Cuban oranges are delicious, but their production supplies only the home demand. It seems surprising that a tropical island like Cuba should import as much fruit as

it exports, but such is the case. Crawley[14] says that, of all the fruits that have been tried on a commercial scale, only oranges and grapefruit have given remunerative results.

The Cuban Population

From the point of view of agricultural development the population of Cuba is not large. It is less than one-tenth of that of Java which has less agricultural land and still provides a surplus for export. According to the enumeration of 1909 (Statesman's Year-Book, 1921) Cuba has a total population of 2,898,905[15] of whom 1,020,411 dwelt in 11 cities.[16]

The permanent increase in population has averaged 65,000 a year during the twenty years of independence, while the excess of births over deaths averages from 40,000 to 45,000 annually, leaving a balance of some 20,000 a year to be accounted for by immigrants who stay in the country. Since the total immigration into Cuba is around 70,000 annually, it is evident that the great proportion of these do not remain permanently. This is, on the whole, a favorable arrangement for Cuba, although still more labor is needed between December and June of each year. Cuba seriously needs other industries which can absorb the unemployed labor of the dull season.

The Spanish explorers found Cuba inhabited by kindly Indians living peacefully under several independent chiefs. Their number was variously estimated at from 200,000 to 1,000,000. The latter figure is the estimate of Bishop Las Casas, one of the most careful students of Indian matters, yet it seems much too high. Under the enforced labor and cruelty of the Spaniards and the white man's diseases, the Indians rapidly disappeared and became practically extinct by 1550. As early as 1521 the importation of African slaves began and continued down to the middle of the nineteenth century. In all, a million blacks were imported.[17] Slavery was abolished in 1880, but many negroes had purchased or otherwise secured their freedom before that date. Much mixing of blood occurred, and it is probable that many of the people who are classed in the census returns as white have a strain of African blood in their veins. Spain did not draw the color line so closely as England or America, and it is not closely drawn in Cuba today. The census of 1877 gives Cuba 1,521,684 inhabitants and reports less than one-third of them as "colored" and over two-thirds as "white." An effort at close discrimination would be unwise and futile, yet the traveler in Cuba is quite skeptical of the latest census figures which class 75 per cent of the Cubans as white. There are unquestionably many pure-blood

[14] J. T. Crawley: Progress of Agricultural Science in Cuba, *Proc. 2nd Pan Amer. Sci. Congr., Dec. 27, 1915, to Jan. 8, 1916*, Vol. 3, Section 3, Conservation, etc., Washington, D. C., pp. 374–382.

[15] By provinces: Pinar del Rio, 266,198 (51 per sq. m.); Havana, 697,583 (219 per sq. m.); Matanzas, 312,704 (95 per sq. m.); Santa Clara, 657,697 (70 per sq. m.); Camaguey, 735,810 (22 per sq. m.); Oriente, 735,810 (51 per sq. m.).

[16] The cities are: Havana, 360,517; Camaguey, 93,057; Cienfuegos, 83,092; Santiago de Cuba, 63,041; Manzanillo, 62,485; Guantánamo, 60,216; Sancti Spiritus, 58,843; Santa Clara, 57,767; Matanzas, 56,468; Pinar del Rio, 52,472; Cárdenas, 32,513.

[17] Census of Cuba, 1899, p. 68.

white Cubans, most of whom are of Spanish extraction. There are also several hundred thousand blacks; the latter are almost wholly engaged in the heavier forms of unskilled labor, especially the labor on the sugar plantations. Regarding the negro of Cuba, the census of 1899 (p. 69) says: "While the statistics of Cuba show a larger proportion of colored than white criminals, the colored population are in some respects superior to the colored population of our Southern States, being more self-reliant, temperate, frugal, and intelligent and, since the abolition of slavery (1880), showing a strong desire to own their own homes, to educate their children, and to improve their condition. In certain kinds of agriculture they are preferred to any other race. . . ."[18]

The country homes of the working people are primitive thatched huts of one or two rooms, usually with an opening for a door and with two or three windows. Often there is no floor and almost no furniture. The weather is never cold, and protection from rain is about all that is needed. One of the most striking contrasts between country life in the United States and in Cuba is in the homes and their surroundings. An attractive country home is seldom seen in Cuba except near the cities or around the sugar centrals. As a rule, little or nothing is done to beautify the surroundings of the homes in the villages and smaller towns. Such work requires effort, and the average Cuban in his tropical climate does not care to expend effort upon such things. Even vegetable gardens are seldom seen, for gardens, too, require effort, while plantain and banana trees do not.

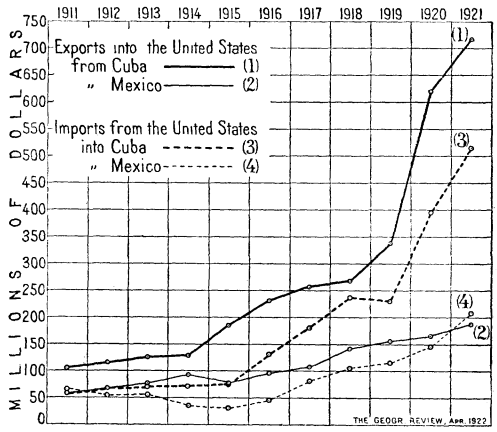

FIG. 7—Graph showing the recent growth of trade between Cuba and the United States. The effect of the close relations between the two countries appears the more striking when comparison is made with trade between Mexico (whose population is 5 times that of Cuba) and the United States.

ROADS AND RAILWAYS

Most country roads, if indeed they may be called roads, are wretched, and in the rainy season well-nigh impassable for wheeled vehicles. During the American occupation excellent macadamized roads were built out from a few of the chief cities, and additional ones have been built by the Cuban government, making a total of 1,300 miles of first-class roads. The principal railways are good. Two Pullman trains leave Havana daily for Santiago, and two return, making the one-way trip of 550 miles in about

[18] See also R. T. Hill: Cuba, *Natl. Geogr. Mag.*, Vol. 9, 1898, pp. 193–242; especially pp. 224–233.

24 hours. The three western provinces are well supplied with railways, but Camaguey and Oriente have large areas without any. However, the constant extension of sugar estates in these provinces is resulting in a constant extension of railway lines. The main trunk line through the middle of the island is joined by lines reaching the many ports, and a great number of short lines connect the sugar centrals with the main lines or with the ports. In all, the island has some 2,800 miles of railway, or six miles for each 100 square miles of land area; this is about the same as in California or Colorado. In addition to the regular railway lines, there are some 4,000 miles of plantation railways belonging to the sugar estates and used wholly in their service. These roads have over 600 locomotives and nearly 20,000 cars for conveying cane. Despite this good showing, parts of Cuba suffer from the lack of transportation facilities. The wretched country roads add heavily to the expense of hauling all of the cane that moves over them. During the war, when manganese was in great demand, several of the mines of Cuba could respond but feebly because of the cost of about a dollar a ton-mile for transporting the ore five to ten miles by carts over unimproved roads.

The Great Foreign Trade of Cuba

Aside from sugar and tobacco, the manufacturing industries of Cuba are small. There is, in consequence, a very heavy import trade in manufactured goods, 90 per cent of which comes from the United States. Cuba's population of less than 3,000,000 buys more American goods than China's 400,000,000; and in 1920 Cuba sold us products of greater value than any other country in the world. The benefit to Cuba of stable government and of close business relations with the United States comes out in a comparison of the trade of Mexico and that of Cuba with the United States between 1911 and 1920. As shown in Figure 7, the trade between Mexico and the United States increased but little while that of Cuba increased 600 per cent. The make-up of Cuba's export trade has averaged about as follows: sugar and its products, 75 per cent; tobacco and its products, 16 per cent; fruit, 2 per cent; minerals, 2 per cent; animals and animal products, 2 per cent; forest products, 1.5 per cent; miscellaneous, 1.5 per cent. The per capita value of exports from Cuba in 1920 was larger than that of any other nation in the world, and this is the same Cuba that in 1898 was facing starvation, and whose industries were all but ruined. Twenty-five years ago the climate was as good, the rainfall as copious, the soil as fertile, the geographical position the same as they are now; but Spain was in control. In 1898, because Cuba lay at our door, we intervened in her struggle for independence; we established and we now guarantee a stable government. Life and property were made safe with the result that new capital is willing to build million-dollar mills, extend railways, establish banks, and throw a car ferry from Key West to Havana. Cuba is capitalizing her fertile lands and advantageous geographical position.